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ABSTRACT

There is an emphasis on meaningmaking, problem solving, and discovery in contemporary educational settings--facts and concepts integrated into the curriculum by unifying themes that connect to real-world experiences. Using graphics to represent the thinking of students in learning and the thinking of teachers in integrated planning can be efficient because they portray much information and effective because they facilitate communication. This paper asserts, however, that a common language of graphics must be presented for graphics to be universally understood in integrated planning. Using top-down and bottom-up thinking to guide graphic selection facilitates planning and learning for all contents, types, and levels of users. Top-down visuals can test ideas against facts or solve specific problems by using concept maps to relate ideas to facts or ideas to other ideas. In contrast, bottom-up graphics help students scan, sort, and organize information. Selecting graphics that communicate but are flexible in their power to represent complex thinking is essential. The graphical representations in this top-down, bottom-up schema provide the common language of graphic tools that is needed, while also allowing for varied interpretation and flexible use by teachers and learners alike. An eight-step instructional plan is outlined, and five figures present examples of graphics from integrated units. (AEF)

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Using Graphics for Integrated Planning

by Peggy A. P. Pruisner

Abstract

Across contemporary educational settings, there is an emphasis on meaning making, problem solving, and discovery in the learning process. In many schools, facts and concepts are no longer presented in a content-based framework; rather, they are fully integrated into the curriculum by a unifying theme that under girds the connections to the world of knowledge. To best represent the thinking of students in learning and the thinking of teachers in integrated planning, the use of graphics is both efficient, portraying much information in its design, and effective, facilitating communication.

Learning and Thinking

Paramount to learning is thinking. Although this statement may sound innocuous, hardly revolutionary, it is the impetus for a dramatic paradigm shift for educators. By emphasizing the contemporary schema-based and process-oriented approaches to literacy and meaning making, and by expanding on the relationships of learning and thinking, the integrated knowledge approach exploits the web of relationships discovered while participating in activities and tasks. The integrated planning that precedes teaching and learning allows learners to gather knowledge holistically.

Integrated Planning

Ackerman and Perkins (1989) suggest that within the integrated paradigm there exist a curriculum and a metacurriculum. The curriculum includes the substantive content and concepts that have comprised the content-driven curriculums of the past and the broader concepts of knowledge structures. Furthermore, the metacurriculum is made up of learning skills and strategies that help students learn the content being taught and foster thinking and independent learning. In any plan derived from the integrated paradigm, planning is no longer a linear and sequential task but involves a variety of paths and explorations based on the thinking and learning of students rather than the instructional agendas of teachers.

For example, creating an integrated unit on identity intended for secondary students, teachers collaboratively plan and provide instruction, activities, and experiences that allow students to explore character development and conflict (ordinarily taught in the framework of English, perhaps in the context of short stories), the importance of self-esteem (typically taught in the framework of health and wellness or guidance), the importance of identity in the family and society (perhaps previously taught in the area of social studies or possibly absent in the former curriculum), and continue in this manner across all curricular areas. This transformed approach to planning calls for new procedures and structures.

Integrated Planning and Graphics

Currently, many skeletal graphic models are recommended for use during the planning stages of integrated unit development. However, these models are either simple or hybrid models of the graphic web and do not adequately allow the curriculum planner to utilize the power of varied graphic forms to display the relationships of the concepts to be taught and the metacurriculum that fosters thinking.

Teachers need to look beyond the graphic web and select a graphic that fits the content or the objective and the thinking process involved. To best communicate the underlying thinking, a common language of graphics must be presented for graphics to be universally understood in integrated planning. Presenting direct instruction in the creation and use of graphic representations based on models of thinking along with the instruction for integrated unit planning utilizes the power of graphics to clarify and represent.

Graphics can represent the many forms of thinking. Hyerle (1996) recommends a hierarchy of graphical representations called thinking maps. His system is compatible with the levels of questioning utilized in most classrooms, and his graphic primitives are combined to represent various levels of thinking; for example, the bubble map and double bubble map primitives can be used in graphics for describing qualities

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and comparing and contrasting; he identifies both as forms of evaluative thinking.

Rakes, Rakes & Smith (1995) recommend the thinking processes involved in analysis, organization, and categorization be presented using the following graphic techniques: semantic maps, flow charts, labeling, tracing, text clues, adjunct questions, and drawings; the thinking involved in elaboration: drawings, charts, graphs, maps, and icons; and the thinking involved in integration: drawings, text questions accompanied by visuals, and pseudo graphics.

The aforementioned systems, although theoretically sound, require users to learn new terms and concepts. One system based on top-down and bottom-up thinking and portrayed using visual tools (Clarke, 1991), however, can make two claims: theoretically sound and pragmatic across all content areas. From a cognitive theory standpoint, there is widespread acceptance of its underpinning in schema theory (Rumelhart, 1980), and the recognition of reading, thinking, and comprehending as the interaction of reader and text across all content areas. Furthermore, the system is pragmatic for the curriculum planner who may not have an in-depth past experience with thinking graphically or who may not prefer the style of thinking with graphics. Using top-down and bottom-up thinking to guide the graphic selection facilitates planning and learning in an integrated framework for all contents, types, and levels of users.

Top-down and Bottom-up Graphics

Clarke (1991) suggests that top-down graphics aid deductive thinking and anchor abstract concepts, processes, rules, or procedures. Top-down visuals can test ideas against facts or solve specific problems by using concept maps to relate ideas to facts or ideas to other ideas, by using weighing scales, continuum lines, or pro/con charts to weigh evidence in support of opposing arguments, using force field diagrams to observe antithetical forces, using causal chain maps to see a model of a process, and using decision trees and if/then flow charts to assist in deciding between two choices. Finally, planning charts, path models, and procedural flow charts can be used to work through specific steps in a task. In contrast, bottom-up graphics that help students scan, sort, and organize information can include the following: time lines for representing chronological events to show trends, recurring patterns, or causes and effects; web diagrams to tie related events to a concept or idea; circle diagrams to guide students to illustrative group events; data grids, pie charts, and graphs to help count recurring events and draw inferences; Venn diagrams and complex matrices to help sort information into multiple categories; and inductive towers to help connect factual information and draw inductive inferences as the basis for theories and predictions.

Flexibility

Selecting graphics that communicate but are flexible in their power to represent complex thinking is essential. Guthrie (1996) warns against formula following in conceptually oriented reading instruction. He warns that if the teacher does not construct the design for planning, the classroom will not be engaged. Consequently, the purchase of a prepublished package by a school system is doomed to failure. The plan must be built on a consistent common language of graphics yet remain flexible for teacher use, and since the match needs to be explained to the students at the instructional stage, it should remain flexible for student input and responsive to student needs.

The graphical representations referred to in this top-down, bottom-up schema have widespread acceptance and understanding among readers, yet they are not excessively prescriptive in their design and certainly not in Clarke's recommended uses. They provide the common language of graphic tools that is needed while allowing for varied interpretation and flexible use by teachers and learners alike.

The Instructional Plan

Based on the need for integrated planning, the power of graphics to communicate those plans, and appropriate match of top-down, bottom-up graphics to student outcomes across all curricular areas, the author has designed and utilized the following directions for integrated planning at inservice presentations and with preservice students at the undergraduate level:

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Planning Integrated Units:

Step 1: Consider the system outcomes established by the school
Step 2: Identify an organizing center: theme, topic, problem, issue that cuts across curricular boundaries; establish theme, concepts, and generalizations
Step 3: Establish general unit objectives: design integrated plan to reflect the underlying top-down, bottom-up thinking students will be using in this unit:

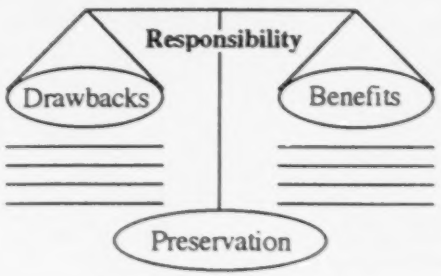
1. Brainstorm and record information needed to achieve critical objectives.
2. Consider the thinking that undergirds student learning: top-down, bottom-up thinking.
3. Review and select appropriate graphics (Clarke, 1991) to represent thinking processes.
4. In drawing the unit graphic representation, consider the following characteristics and their relationships:
   - •composition
     - -organization
     - -center of interest
   - •shapes
   - •sizes
   - •colors
   - •pictorial elements.
5. After drawing your graphic, ask someone unfamiliar with the content but who thinks visually to explain what can be determined from your drawing. Revise as needed to communicate more effectively.
6. Prepare the graphic for including the information derived in the planning *steps*. *Steps 1-7* include the systems outcomes, theme, concepts, generalizations, unit objectives, resources, instructional procedures, unit introduction, development, culmination, and plan for evaluation; these are to be written in the areas that seem most appropriate for the graphic chosen, so be creative but purposeful in this process. Because of the limitations of the graphic design or simply because of space considerations, these may be listed and referred to on the graphic and attached in their entirety using additional paper.

Step 4: Brainstorm resources and procedures
Step 5: Gather resources
Step 6: Design instructional procedures: unit introduction, development, and culmination
Step 7: Plan evaluation
Step 8: Schedule unit events

Example Integrated Units

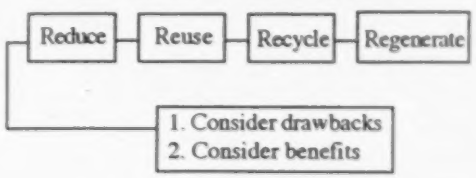
Utilizing the integrated planning graphics, imagine that a group of collaborating teachers considers a variety of outcomes for a unit on environmental responsibility. Their initial plan emphasizes weighing the benefits and drawbacks of preserving the environment and recycling waste, an example of top-down thinking (see Figure 1).

Figure 1
ENVIRONMENTAL RESPONSIBILITY
Balance Scale



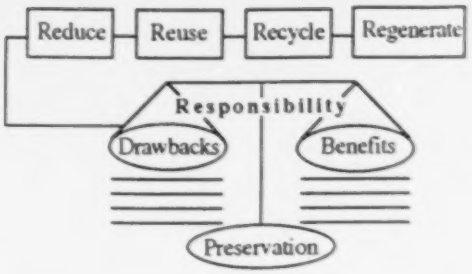
The ongoing dialogue among the teachers emphasizes the need for individual action. Therefore, a planning chart, another example of top-down thinking, is an effective graphic representation of another desirable outcome of the unit (see Figure 2).

Figure 2
ENVIRONMENTAL RESPONSIBILITY
Preservation Planning Chart



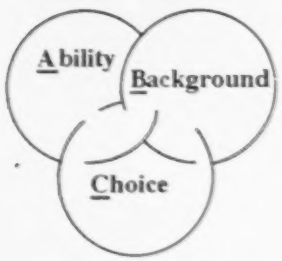
By integrating the content, the outcomes, and the representative thinking required, a revised graphic that combines the two previous models is created. The new graphic provides the background structure for continuing the planning process where resources, instruction, and evaluation can be recorded (see Figure 3).

Figure 3
ENVIRONMENTAL RESPONSIBILITY
Balance Scale/Planning Chart



Another educational team working on the topic of diversity contemplates an outcome requiring students to look at the characteristics of diversity across several categories; a Venn diagram is an appropriate bottom-up graphic (see Figure 4).

Figure 4
ABCs of DIVERSITY
Venn Diagram



Recognizing that students will need to understand the relationships of those categories and their component parts, they design another bottom-up graphic, a web, extending from the Venn diagram. However, as they discuss the relationships of the components, it becomes apparent that other relationships must be considered; for example, the interrelationship of ability and effort can result in a level of achievement. Consequently, further linkages transform the web into a concept map (see Figure 5).

Figure 5
ABCs of DIVERSITY
Venn Diagram

In Conclusion

When recognized for their strength, the capacity to concisely communicate meaning, and respected in spite of their limitation, the difficulty of representing the complexities of thinking in a confined space, graphics can be powerful tools in the hands of curriculum planners. Graphics can help clarify the thinking that accompanies planning and can direct the thinking that facilitates student learning. The representation of that student engagement in the act of thinking can be concisely portrayed with graphics when there is consistent use of clearly defined graphics, a match to the process of thinking, and a respect for the gestalt of learning.

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